CLAIMS

1. Process for the preparation of a block copolymer, the process being carried out in the presence of a multifunctional initiator and comprising at least one enzymatically catalyzed homo- or copolymerization reaction and at least one non-enzymatically catalyzed controlled homo- or copolymerization reaction, characterized in that the non-enzymatically catalyzed controlled homo- or copolymerization reaction is chosen from the group comprising a free radical polymerization reaction, an ionic polymerization reaction, a polycondensation reaction, and a ring opening polymerization (ROP) reaction.
2. Process according to claim 1, wherein the non-enzymatically catalyzed controlled polymerization reaction is a nitroxide mediated radical polymerization reaction.
3. Process according to claim 1 or claim 2, wherein the non-enzymatically catalyzed controlled polymerization reaction involves the polymerization of a monomer selected from the group comprising (meth)acrylates, styrenes, acrylonitriles, vinyl pyridines, vinyl formamide, (meth)acrylamides, and maleimides.
4. Process according to any one of claims 1-3, wherein the enzymatically catalyzed polymerization reaction is a ROP reaction.
5. Process according to claim 4, wherein optionally substituted ε-caprolactone is used as a monomer.
6. Process according to claim 5, wherein the optionally substituted ε-caprolactone is a substituted ε-caprolactone.
7. Process according to any one of claims 1-6, wherein the enzymatically catalyzed polymerization reaction is catalysed by a lipase of class EC 3.1.1.3.
8. Process according to claim 7, wherein the lipase is chosen from the group comprising Candida antarctica Lipase B, Pseudomonas cepacia (lipase PS-30), porcine pancreatic lipase (PPL), Candida cylindracea (lipase CCL), Candida Rugosa (lipase CR), Mucor Miehei (lipozyme), Pseudomonas aeruginosa (lipase PA), Pseudomonas fluorescence (lipase PF), and Aspergillus niger (lipase A).
9. Process according to any one of claims 1-8, wherein at least one enzymatically catalyzed polymerization reaction and at least one non-

enzymatically catalyzed controlled polymerization reaction are carried out in bulk.

10. Process according to any one of claims 1-9, wherein at least one enzymatically catalyzed polymerization reaction and at least one non-enzymatically catalyzed controlled polymerization reaction are carried out in one pot.

11. Process according to claim 10, wherein at least one enzymatically catalyzed polymerization reaction and at least one non-enzymatically catalyzed controlled polymerization reaction are carried out simultaneously.

12. Chiral block copolymer wherein at least one block comprises at least one substituted ε-caprolactone derivative.

13. Chiral block copolymer according to claim 12 having an M_w/M_n in the range 1.1-2.5.

14. Chiral block copolymer according to claim 12 or claim 13, obtainable by a process according to any one of claims 1-11.